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Please send correspondence to:
Dr David H. Eddy Spicer
Department of Education
University of Bath
Bath BA2 7AY
United Kingdom
e: D.EddySpicer@bath.ac.uk
p: +44(0)1225 384849
f: +44(0)1225 386113

Power and Knowledge-building in Teacher Inquiry: Negotiating Interpersonal and Ideational Difference

Abstract

Professional collaboration in schools features prominently in contemporary approaches to educational change. Advocates highlight the importance of situated knowledge to continuous teacher learning, sustained school reform, and improved student learning. Critics portray collaboration as an invisible and coercive means of official control. The framework presented in this paper aims to treat these perspectives not as ideological positions but as starting points for empirical investigation into the dynamics of power in professional collaboration. The framework draws on social-semiotic theories of language and functional linguistics to portray the ways in which the development of ideas and the development of social relations—ideational and interpersonal meaning—move in concert. Excerpts from an in-depth study of interaction among science teachers and teacher-leaders in a secondary school undergoing broad reform illustrate application of this framework. Attention to the dynamics of support and challenge in the most generative of these interactions reveals distinctive patterns of the negotiation of interpersonal and ideational meaning. These patterns of control provide a means of connecting the microprocesses of building knowledge with the broader dynamics of power at play in educational change.

[181 words]

Keywords

teacher collaboration, learning processes, semiotics, knowledge base for teaching, educational change, group dynamics

Introduction

Collaboration among teachers and between teachers and school leaders has assumed a central, if contested, place in contemporary approaches to educational change. Research

spanning three decades has emphasized the important role of collegial interaction in the mutual development of individual teachers and the institutions in which they work (Feiman-Nemser 2001; Goddard *et al.* 2007; Grossman 1992; Little 1982; McLaughlin and Talbert 2001; Shulman 1987). Critical perspectives have questioned whether the emphasis on the collective actually serves as a less visible way of exerting official control over local sites of knowledge production (Anderson 1999; Wood 2007). These contrasting views reflect important differences over the agency of individuals, the nature of collective action, and the extent of institutional control in educational change. The framework presented in this paper elaborates a way of linking patterns of social interaction with efforts to build knowledge around aspects of professional practice. An understanding of the microprocesses of knowledge construction offers a means of understanding the dynamics of power in teacher inquiry through empirical study.

Collective inquiry, as used here, is an idealized form of collaboration typified by critical engagement with core pedagogical issues in ways that lead towards new forms of work and products of work. Judith Warren Little, among the first to draw systematic attention to the potential of teachers' collaborative work, offers a succinct depiction of the ideal of inquiry, "Teachers engage in frequent, continuous and increasingly precise *talk* about teaching practice ... By such talk, teachers build up a shared language, adequate to the complexity of teaching, capable of distinguishing one practice and its virtue from another" (Little 1982, 12-13, emphasis in original). Related terms for interaction that bends towards precision in description, distinction of elements, and evaluation of worth (i.e., Little's "virtue") are reflective dialogue (Bolam *et al.* 2005; Louis *et al.* 1996) and progressive discourse (Bereiter 1994; Wells 1999). These labels draw attention to the process of collective meaning making among teachers aimed at building knowledge around teaching practice.

The approach developed here aims to describe systematically how teachers make collective and individual meaning within and through interaction. I first develop a conceptual characterization of collective inquiry starting from two widely disparate sources—talk between mothers and children and casual conversation among friends. Ruqaiya Hasan's (2001; Hasan *et al.* 1996) seminal work in mother-child interaction elaborates how context-independent or decontextualized language contributes to building knowledge. Drawing on a distinctly different kind of interaction, Suzanne Eggins and Diane Slade (1997) characterize the dynamics of casual conversation among adults, emphasizing the "negotiation of difference"—the ways talk develops and maintains social bonds. Both bodies of research share a common foundation in social semiotic theories of language.

Social semiotics brings into a single frame the twinned aspects of developing social connections and developing connections among ideas. Moreover, social semiotics in the tradition of linguistic theorist Michael Halliday provides conceptual and analytic tools to connect patterns of meaning making in particular settings with historically-established patterns of social structure (1978; Halliday and Hasan 1989). Halliday and Hasan (1989) emphasize the resonance of the social and cultural surround in the development of knowledge through everyday interactions:

> Knowledge is transmitted in social contexts, through relationships, like those of parent and child, or teacher and pupil, or classmates, that are defined in the value system and ideology of the culture. And the words that are exchanged in these contexts get their meaning from activities in which they are embedded, which again are social activities with social agencies and goals. (5)

The conceptualization of collective inquiry as a negotiation of social relations and relations among ideas underlies the analytic framework presented in the remainder of the paper. This includes detailed discussion of sampling, an approach to coding and the identification of specific patterns of interactional control characteristic of collective inquiry. I illustrate the analytic framework with examples drawn from a study of interaction among science teachers and teacher-leaders (Eddy Spicer 2006). The study examined one part of a broader effort within a comprehensive, urban public high-school in the U.S. aimed at instituting a common framework for lesson planning and instruction across disciplines as a means of promoting greater professional engagement and student achievement.

Characterizing Collective Inquiry

This section develops an account of collective inquiry from the social semiotic perspective. The lens of social semiotics brings into focus the process of collective inquiry as a conjoined negotiation of interpersonal and ideational difference. As I subsequently elaborate, sustaining interaction through support and challenge is fundamental to such negotiation.

The close examination of collective teacher inquiry as a process has assumed increasing importance in studies of collaboration and the development of teaching practice (Little 2003). Recent research that details the process of teachers' collective learning foregrounds the substance of interaction and its development (Borko 2004; Grossman *et al.* 2001; Horn 2007; Little 2002; 2003; Stoll *et al.* 2006). These studies helpfully illuminate important aspects of the ways in which knowledge and practice mutually develop, or fail to develop, through group interaction. In general, the ideal of progressive discourse upheld in these and other studies of the process of teachers' collective knowledge-building assumes that generative moments are most likely to occur when the dynamics of power within the group are held in abeyance, enabling all to participate as equals. The converse of this assumption is that the exercise of power inhibits possibilities for sustained interaction and making meaning.

Close examination of the dynamics of social relations in multiparty conversation and how these dynamics relate to organizational context show power to be pervasive and equality of participation to be an accomplishment of interaction, not a precondition for it (e.g., Donnellon 1996; Hall 2002; Scribner *et al.* 2007). Exploring the management of interpersonal relations in casual conversation among friends illuminates this point because casual conversation presumes that participants treat one another as equals. Informal, group conversations among friends differ markedly from collective inquiry among professionals in many ways. Unlike collective inquiry, the choice of topic is not predetermined nor is the topic stable across the conversation. In casual conversation among friends, the possibility always exists of bouncing from one topic to another or weaving among several topics in the interests of sustaining, rather than terminating, interaction. Consequently, the staging of the conversation, its overall structure, is difficult to define in anything other than the most general terms.

Nonetheless, the main aim of casual conversation, as in collective inquiry, is to keep the interaction flowing among those taking part. An understanding of casual conversation offers a situation that would, on its surface, exemplify a type of interaction that requires equality of relations as a precondition. Research into casual conversation does show a fluidity of role relationships based on the assumption of social equality. This lack of explicit definition of social roles has several ramifications. For example, there is greater competition for turns, and interactants can align with one another in different configurations. The fluidity of social roles

and increased competition for turns are both features of multiparty interaction or multilogue (Eggins and Slade 1997, 20).

Rather than reveal a level field of interaction from the start, Eggins and Slade's analyses of casual conversation (1997) identify what they term the "negotiation of difference" as crucial to sustained interaction among friends. Their studies highlight the interplay of support and challenge as particular dimensions of the negotiation of interpersonal meaning crucial for sustaining conversation among those whose roles in conversation are not bound by professional or hierarchical relations. Both support and challenge can be used to express affinity and to sustain conversation or close it down. Support and challenge permit those taking part, "to explore and adjust their alignments and intimacy with each other, and provide evidence of the ongoing negotiation of differences" (169).

A focus on negotiation of interpersonal difference and the roles of support and challenge opens up the social world as a crucial component of sustained interaction. However, the kind of progressive discourse that marks collective inquiry entails the additional dimension of negotiating difference in ideas. To understand this aspect of collective inquiry, I turn to another body of research that employs social semiotic theories of language to elaborate the social processes of conceptualization. A social semiotic perspective maintains that constructing collective meaning about actions and ideas is bound up with negotiating interpersonal meaning. That is, the generativity of ideas depends on the generativity of social relations (Hasan 2001). Such generative co-construction of ideational and social relations exemplifies what Vygotsky (1978) described as a developmental process "deeply rooted in the links between individual and social history" (30).

Linguist Ruqaiya Hasan and her colleagues at Macquerie University draw on a large corpus of naturalistic conversation between mothers and toddlers in an effort to understand children's development of language that has no direct connection to the immediate situation in which interaction occurs (2001; Hasan and Webster 2009). Their research explores how the development of such decontextualized language at home mirrors the kinds of knowledge construction expected, but not necessarily cultivated, in schooling.

Decontextualized language is independent of the immediate context of interaction. The notion of 'decontextualized' does not mean that no context exists but that the use of language is removed from immediate experience with no direct link to an actual (i.e., material or physical) context. Instead, decontextualized language operates within what Hasan (2001) labels a "virtual context of situation" (54). Virtual contexts can only be apprehended through the use of concepts and their connections (55). For this reason, the use of decontextualized language in virtual contexts is crucial to knowledge-building. Although virtual contexts are integral to decontextualized language, such contexts are not necessarily sufficient for conceptual development. Knowledge-building hinges on the interplay of virtual and actual contexts of situation, the movement from contextualized to decontextualized language.

Hasan (2001) makes two important points about the relationship of actual and virtual contexts of situation in relation to the appearance of decontextualized language. The first point relates to how virtual and actual contexts interweave and the second relates to dynamics within specific situations. Actual and virtual are not dichotomous types of contexts; each is interwoven to varying degrees in different contexts of situation. The variation corresponds with degrees of generalizations and reference to "realities of different orders", on a continuum ranging from actual contexts in which language supports ongoing action to those

contexts in which language is the action (57). In conversation among teachers this might be seen as varying from sharing anecdotes about specific incidents in class on a particular day (actual), to making claims about what typically happens with a given class (actual-virtual), to broader generalizations about the nature of teaching particular types of classes or students (virtual).

In the midst of interaction, actual and virtual contexts interweave with the progress of discourse. The interweaving of the immediate and the intelligible is crucial to a collective process of inquiring into practice. This gives us a view of collective inquiry not as an accomplishment but as a developmental process from referring to actual elements of contexts of situation, "What happened today in class?", to virtual elements that seek, in words cited earlier from Little (1982), to cultivate the capability of "distinguishing one practice and its virtue from another"(13). Such qualitative shifts in meaning making would not be possible without movement along orders of reality interweaving the immediate with the intelligible.

Hasan (2001) describes the qualitative movement in meaning-making as a reclassification of the context of interaction. She emphasizes that such reclassification does not involve a leap from one context to another—from actual to virtual. Rather it entails movement back and forth—reclassification and integration of contexts, with each reclassification implying, "a (somewhat) new context with an identity of its own, and at the same time, a context that is contributing to the primary context" (63). Such reclassification happens as a result of a reordering of social relations between adult and child. Hasan's research reveals that the process of actively making meaning with the child, rather than imposing or proposing meaning, is only possible with the reordering of social relations.

Hasan's contribution to the view of collective inquiry developed here is to tether the progressive negotiation of difference in ideas to the notion of progressive negotiation of interpersonal difference. The concept of reclassification, embracing both ideational and interpersonal difference, can productively be put alongside the insights of Eggins and Slade into support and challenge as crucial to sustaining the progressive interaction that is the hallmark of collective inquiry. The identification of patterns of support and challenge in generative moments of collaboration can serve as important means of revealing the negotiation of difference that constitutes reclassification.

A Social Semiotic Approach to Collective Inquiry

Both Hasan and Eggins and Slade elaborate their social semiotic views of language and interaction with the tools of systemic functional linguistics. Functional linguistics offers a way of systematically relating patterns of language use to patterns of social relations (Eggins and Martin 1997, 242). These patterns relate to the functions language serves in particular settings, labeled as speech functions that characterize what a speaker "achieves" in terms of the development of both ideational and interpersonal meaning (Eggins 2000, 136). In this way, patterns of speech function stand to reveal qualitative differences in the negotiation of interpersonal and ideational meanings as part of teachers' collaborative work.

Speech function labels are the building blocks I use to relate meaning-making through language to the broader contexts in which people interact. These codes do so by systematically describing the functions discrete segments of interaction serve in moving the interaction further or shutting it down. My approach draws on speech function labels elaborated in Eggins & Slade (1997, see in particular 169-226) and Eggins (2004, 141-87),

which build on Martin's considerations of meaning making through dialogue (1992, 31-91) and Eggins' studies of casual conversation (1990). Underlying all is Halliday's conceptual characterization of the nature of dialogue (1994, 68-69; Halliday and Matthiessen 2004, 106-11).

Identifying Exchanges and Moves

The analysis of discourse used here depends on structural features of language different from but related to grammatical structure. Following the lead of Sinclair and Coulthard (1975), systemic functional linguistics distinguishes a "rank scale" of hierarchically-organized discourse units. Thus, sequences encompass exchanges, which in turn encompass moves. The analysis elaborated here uses the unit of "move" as the fundamental unit and "exchange" as the primary unit of analysis. Each sequence is made up of two to four dozen exchanges. An *exchange* begins when one of the participants initiates a new focus (specifically a new Opening move, see below) and includes all subsequent interaction that sustains dialogue until someone introduces another focus. An exchange is made up of speaker turns, and each speaker's turn may be broken down into several smaller bits of speech. These are *moves*, the functional building blocks of interaction.[1]

Figure 1 diagrams the schematic organization of a sequence of spoken discourse among three interactants, A, B, and C. Speaker A initiates the sequence with an opening move and then makes two additional moves within her turn before Speaker B's turn, consisting of one move (e.g., an acknowledgement). Speaker C then takes a turn consisting of two moves.

[FIGURE 1 ABOUT HERE]

In summary, sequences are topically defined stretches of interaction that are made up of exchanges, which can be defined grammatically (because of the marked grammatical structure associated with Opening moves) and semantically (because of the thematic shifts that demarcate exchange boundaries). Exchanges, in turn are made up of speaker turns, which can be further broken down into moves, the basic building blocks of interaction.

Categorizing Speech Function

Below I list the major categories of speech function labels that can be applied to moves and give brief details of the codes included in each category.[2] The descriptions of the codes include not only a description of the discourse purpose but also a characterization of the grammatical mood that corresponds to each speech function. My analysis emphasizes function at the discourse-semantic level; however, I rely on Eggins and Slade (1997) descriptions of congruent mood as a support for resolving coding conflicts. Moves at the discourse-semantic level are expressed at the grammatical level by patterns of clause types identified by mood. Mood types characterize the major grammatical patterns that realize interpersonal meanings through language. Mood types include such familiar classes of clauses as declarative, imperative, and interrogative.[3] The system of mood provides a grammatical basis for characterizing discourse function. Eggins and Slade (1997, 177)

[1] Moves do not necessarily correspond to clauses, although in many cases they do. The delineation of moves depends foremost on tonic patterns in speech. Eggins and Slade contains a useful section on move identification (1997, 186-189).

[2] The codebook and examples of application of the codes are accessible online at <[URL withheld]>.

[3] For detailed discussions of Mood, see Chapter 6 in Eggins (2004, 141-188) and Halliday and Matthiessen, Chapter 3 (2004, 64-105).

caution that particular mood structures do not map directly onto particular discourse functions in that clauses of the same mood types can serve different discourse functions and clauses of different mood types can serve equivalent functions. Nonetheless, mood structure serves as an important resource alongside semantic resources for exploring how meanings are constructed in interaction. Providing this grammatical resource is among the principal strengths of a functional approach to discourse analysis.

Below I review the eight major groupings I use in order to make a further point about the ways that particular speech functions work to open up or constrain interaction:

1. Opening moves (OP) initiate an exchange.
2. Continuing moves (CO) maintain a speaker's turn.
3. Supportive replies (RY+) affirm a prior speaker's turn while tending to close off the exchange (Eggins and Slade 1997, 182).
4. Developing moves (DV) involve other interactants in supporting and expanding upon an earlier speaker's turn.
5. Tracking moves (RJ+) are rejoinders that sustain interaction by requiring further interaction.
6. Confrontational replies (RY-) tend to invite explanation or justification in ways that minimally sustain interaction (Eggins and Slade 1997, 182).
7. Challenging moves (RJ-) are rejoinders that raise questions or challenge other interactants in ways that demand sustained interaction.
8. Miscellaneous moves (MS) are those not identified by other categories.

The major classes of moves allow me to build a matrix, Table 1, based on the two dimensions of group interaction involved in the negotiation of difference—that of sustaining versus closing down interaction and that of supporting or challenging interaction.

[TABLE 1 ABOUT HERE]

Collective inquiry, as a process of reclassification, relies on elaborating ideas through support and challenge by sustaining interaction. The moves of greatest interest to this work are those in the right-hand column of Table 2. To sustain interaction, collective inquiry needs to rely on the rejoinder moves, either supportive (RJ+) or challenging (RJ-), as well as developing moves (DV).

I have bracketed developing moves above (<DV>) to emphasize that these moves are functionally distinct. Developing moves sustain interaction by building on the existing proposition in ways that do not necessarily demand continued interaction. Rejoinders, whether confrontational or supportive, are more complex interpersonally and typically require continued interaction or are the result of continued interaction. An analogy would be that of using building blocks to build a tower versus an arch. Developing moves are like stacking similar kinds of blocks one on top of another to build a tower. With each block, the tower is stable and could be considered complete. Building an arch is more complicated, with one block requiring another to achieve overall stability. The arch is similar to rejoinder moves that sustain interaction by requiring response.

Selecting Sequences for Detailed Analysis

Careful selection of the sample hinges on identifying sequences that appear to hold promise of revealing reclassification at work. In my study of the work of a science team across three

settings of professional development activity (Eddy Spicer 2006), I selected key sequences for detailed analysis by reviewing my out-of-field event summaries for every documented event. My first sampling criterion was that the event had to be considered successful in terms of generating a "successful" work product. I defined success as (a) generative use in other settings beyond the event in which it was created and (b) comments in interviews or through observations by teachers about the efficacy of the work product in accomplishing the goals for which it was intended.

I call such generative stretches of interaction *sequences of pedagogical understanding*. These sequences are excerpts of joint activity that are concerned with elaborating, through justifications and explanations, topics related to teaching, subject matter, and student learning. Such portions involve retrospective and prospective discussions of classroom processes, as well as discussion of interactions with students.[4] I identified these sequences semantically by looking for clearly demarcated passages of interaction through which a set of topics related to the creation of the final product was "introduced, negotiated, and brought to completion" (Wells 1999, 236). I then did my own detailed transcriptions of these passages, which ranged in length from twenty to fifty minutes, using the CHAT transcription conventions (MacWhinney 2000).

Analyzing Interaction

I used speech function to analyze sequences in two ways. First, I looked at the categories of codes within a given sequence as a whole (synoptically). I then looked at how patterns of codes unfurled over time (dynamically) to identify patterns of moves at the level of the exchange. For detailed analyses of speech function codes at the level of sequence and exchange, I used several routines within the CLAN language analysis software package (MacWhinney 2000; Spektor 2005).[5] Finally, I explored differences and similarities in the distributions and patterns of speech function for each participant within and across settings.

Check-Coding Speech Function Categories.

I carried out revisions to my approach to coding with crucial input from two colleagues who were well-versed in sociolinguistics and discourse analysis but not in functional grammar. My colleagues coded 12 exchanges I selected at the beginning, middle, and end of four sequences. (By delimiting exchanges for my co-coders, I excluded the Opening moves from co-coding. The identification of Opening moves required more information than transcriptions of interaction provided, especially in terms of tonal contour and knowledge of the context.) The text coded amounted to 20 percent of the overall turns in these sequences. I then compared their coding of six major classes (continuing, supportive reply, confrontational reply, challenging, tracking and develop) with my own and found an average of 78 percent agreement across all 12 exchanges, varying from a high of 94 percent to a low of 67 percent. We were most likely to be in agreement around classifying continuing confrontational reply and develop classes of moves; least likely were tracking moves due to confusion about adjacency pairs in the tracking category. Subsequent conversations led us to conclude that

[4] In characterizing sequences, I drew on the work of Horn (2002) who uses the term "episodes of pedagogical reasoning" to define a unit of analysis in her study of collegial interaction in teacher teams.

[5] Information about CLAN is available on the website of the Child Language Data Exchange System (CHILDES) project at Carnegie-Mellon University: <http://childes.psy.cmu.edu/>. I used the MLT (mean length of turn) program to calculate the number of moves, turns, and words per speaker for a given sequence or exchanges within the sequence, and I used the FREQ (frequency) program to calculate the frequency of different codes. The GEM program, used in combination with the preceding programs, allowed me to mark particular exchanges within a longer sequence for analysis.

continued work with these codes over an extended period would yield greater reliability. Also, co-coders knowledge of functional grammar and use of the congruent mood descriptors, mentioned above, would likely improve overall reliability.

Negotiation of Difference as Patterns of Support and Challenge

A key to addressing differences and similarities in types of interaction is the identification of typical patterns of supportive and challenging interaction that involve several related speech functions at the level of the exchange. I describe these as *exchange sets* of speech functions that perform similar roles in two or more sequences, akin to the "discourse microgenres" in pedagogical conversations identified by Sinclair & Coulthard (1975) and many subsequent studies of micro-patterns in interaction. The patterns identified in the exchange sets do not hinge on a mandatory progression of moves but on the aggregate of classes of moves within the exchange. Certain speech functions dominate in each exchange set, providing the identifying characteristics for that set.

As explained above, the sequences of pedagogical understanding were selected on the basis of the sustained and generative interaction that occurred in each. The patterns I identified, consisting of four supportive and one challenging exchange sets, were thus linked with sustained interaction. Patterns of support and challenge at the level of the exchange range from simple affirmation of another interactants' continuing moves to more complex interaction involving contributions from several interactants and entailing more assertive moves that demand explanation and justification. A single pattern characterized sustained challenge, marked by challenging rejoinders (RJ-) as the dominant speech function. The four exchange sets of sustained support that I identified are listed in Table 2.

[TABLE 2 ABOUT HERE]

The sustained patterns of support are arrayed in Table 2 according to the degree to which a set is likely to open up the exchange to continued interaction, with contributions from multiple participants that take the discussion into new areas. For example, the first set listed above, presentation, depends solely on the primary interactant's ability to sustain the exchange by controlling all turns, often in a monologue. The fourth, co-development through tracking, on the other hand, entails substantive contributions from two or more interactants. This last set typically involves extensive turn-taking, with expansion of the proposition that began the exchange occurring not only through development moves but also through the drawing out of implications by a subcategory of the supportive rejoinder speech function labeled a "tracking probe".

The discussion below focuses on the last two of the four supportive sets and then explores the part played by challenging moves within the exchange.[6] The section concludes with my findings around the interweaving of challenge and support across exchanges to sustain interaction.

Co-development

Mutual development is marked by a rapid sequence of other-development moves. This is in juxtaposition to the presentation set, which is composed mainly of continuing moves, through which a single speaker sustains or recoups her turn. Instances of co-development in my data typically involve between two to four interactants, regardless of the size of the meeting.

[6] For a more detailed explanation of each of the exchange sets presented here, please see [author] 2006.

Previous research highlights the importance of the kind of rapid "latching" evinced in co-development for pushing ideas forward (Sawyer and Berson 2004). This is taken as a mutually supportive way of building on the old to derive new meaning. An excerpt from a March 29th meeting about curriculum design shows the use of other-development for expanding the focus of the discussion. Below, the three team members, Mary, Ana, and Helen, have been struggling with identifying a culminating activity for the model unit they have been developing. The activity needed to take aim at the central areas of understanding they hoped students would gain throughout the unit. Mary and Ana work together to define just what such an activity might emphasize.

Excerpt 1[7]
Team meeting, 29 March 2005 (exchange 11: 654-694)

Mary: We really we want them to explain # the um right conservation of energy. (1a) Right <ultimately> [>]? (1b)

Ana: <Energy> [<] transfers. (2)

Mary: Yeah and cuz so <they could describe> [>] # energy transfer. (3)

Helen: <Might be just> [<]... (4)

Mary: # In a food web. (5)

Ana: Um hm. (6)

Mary: In [///] in some [//] in their body. (7)

Ana: So in any biological system. (8)

Mary: It doesn't matt(er) [///] Yeah so <I don't particularly care> [>] if they know ... (9)

Ana: <So it should be some> [<] ...(10)

Mary: Yeah # yeah. (11a) In the body in the thing. (11b)

Ana: (Be)cause it seems like...(12a)[sighs] I don't know. (12b)

Mary: ## So if you could # describe energy flow in the food chain and like get down to like the macro molecule level (13a) and also the loss of energy for the ...(13b) You know what I mean like heat [//] loss of heat energy um [///] (13c) loss of energy in the form of heat.(13d)

In this excerpt, mutual development sustains for several turns in a rapid way, with one speaker after another completing the preceding speaker's move (moves 1a to 12a). As Sacks et al. (1974) points out, this kind of latching is not evidence of competition for time to be heard—none of the participants expresses frustration or challenges the rights of others to complete her thoughts. Rather, co-development allows for a quick vetting of new ideas (Sawyer and Berson 2004). The excerpt above takes a revealing turn with Ana's disavowal ("I don't know") in move 12b, after which she withdraws from interaction. Mary then assumes responsibility for continuing the development of ideas on her own, which she does through prolonging moves (moves 13a to 13d).

Co-development through tracking
Co-development that takes interaction into new areas may involve a mix of other-completion of moves as above, along with tracking probe moves. The example below comes from a May

[7] Please see the appendix for transcription conventions.

26th workshop. Here Helen, Chet, and Ana discussed how much prior knowledge students would need to carry out a lab using water wheels towards the end of the course.

Excerpt 2
Workshop, 26 May 2005 (exchange 20: 1007-1051)

Chet: I think that they understand what K E [kinetic energy] and P E [potential energy] is hopefully at that point # and work (1a) and then you understand and you have the water reservoir (1b) and it has potential energy and can you now apply some of these things into a project (1c) and if they have to then they have to revisit it. (1d) Some of them will and some of them won't. (1e)

Helen: I mean I think the efficiency piece of it could be new. (2)

Chet: which is where the heat hit kit kicks in, right? (3)

Helen: Right yeah. (4)

Chet: Because everything is lost to heat # pretty much. (5)

Helen: And the water wheels ties in really well with the research project. (6)

Chet: Right. (7a) We could always try it. (7b)

Helen: Yep. (8)

Chet: And if we don't like it <go back to something else> [>]. (9)

Ana: <You could also do it> [<] like in terms of like lifting: like mechanics problems that were tying forces? (10a) You know what I mean? (10b) Like energy it takes to [//] like just more force problems? (10c)

Helen: Um hm. (11)

Chet: Um hm. (12)

Ana: Like work and force # kind of connection there. (13)

This excerpt proceeds through an initial series of self-development moves (Chet, 1a-e), then other-development of ideas already presented (Helen, move 2), followed by a brief probe (Chet, move 3) and resolve (Helen, move 4) that check for mutual understanding. The interaction then proceeds with further development (Chet and Helen, moves 5, 6) until Ana introduces a new idea for ratification through the final probing move (move 10c). In this brief excerpt from one exchange, there is a step-wise progression of tracking and development, with the development moves functioning as markers of agreement that enable another speaker, Ana in this case, to enter the interaction with a probing move that offers yet another opportunity to expand the interaction.

In the entire corpus of the original study, mutual development appears frequently as a means of checking in or regrouping after ideas have already been broached. The brief series of development moves following earlier tracking moves demonstrates this kind of rapid review, drawing in all those who had contributed to earlier discussion.

The moves I have labeled as tracking probes volunteer further details or implications for confirmation by others. The other most common type of tracking move is a clarifying move. Clarifying moves also introduce a new element but that element is a restatement or interpretation of what the speaker believes to have been implied in the preceding move. A

tracking probe move goes further by introducing a new element for confirmation, as Ana does in move 10c of Excerpt 2. The semantic content of a tracking probe is close to that of a developing move, which also contributes new content; however, the tracking probe is not necessarily in such direct, implied alignment with the prior speaker. The tracking probe can be an intellectually assertive move that stops short of challenge. A challenging move, as shown below, either presents an explicit challenge through a declarative statement or an implicit challenge through an assertive question. The tracking probe brings new information into the conversation but requests confirmation with a question tag at the end or through a rising tone that implies a question.

Excerpt 3 below is a different example of the interplay among tracking probe and development moves from the team meeting on April 26th. In this instance, tracking probe moves function to align the proposition put forward by one speaker with information of others; development moves then serve to affirm that alignment as others build on the core ideas.

Excerpt 3
Team meeting, 26 April 2005 (exchange 21: 1058-1086)

Mary: So does this make sense?(1)

Ana: I think so. (2a) Wait # all these things are just gonna be xxx understanding <performances> [>]? (2b)

Helen: <all of these> [<] things are listed in the understanding performances but … (3)

Ana: Oh and these are the assessments? (4)

Helen: But then like underneath # in the ongoing assessment # like … (5)

Ana: ## Adding <like the reflections or> [>] … (6)

Helen: <I think it would be like> [<] like “teacher will assess dietary analysis for…” (7)

Ana: # This kind of thing? (8) [pointing to an example on paper]

Helen: Correct. (9)

Ana: Like describe <like what> [>] xxx … (10)

Helen: <calculations> [<]. (11)

Mary: You could say for a class data table because xxx … (12)

Table 3 presents a schematic of interactional pairs and corresponding speech functions, beginning with the second move, 2b, of Ana’s first turn (“Wait… all these things just gonna be [?] understanding performances?”).

[TABLE 3 ABOUT HERE]

Ana’s first attempts at clarification (move 2b, 4) yield a resolve and then a repair from Helen (moves 3, 5). The next move of Ana’s, move 6, is a development, a more forthright step in which she attempts to build on Helen’s prior move. As with the preceding clarification, this results in a repair that necessitates further clarification. Ana’s final move in this excerpt is another development move, and this time, it meets not with a repair but acceptance from first Helen and then Mary, who each expand upon it in turn. The interplay among tracking probe

and development moves appears as an important means of sustained negotiation of difference in a supportive way.

Exchange Sets of Sustained Challenge

I have detailed the ways in which knowledge building occurs through patterns of sustained support because the role of support is not typically elaborated in discussions of inquiry. Sustained challenge has received far greater emphasis as a marker of successful inquiry, encapsulated by such descriptors as “critical collegiality” (Lord 1994). Such may well be the case when looking at the meso-scale of hours and days and when placing primary emphasis on thematic development. However sustained challenge at the micro-scale of turn-by-turn interaction looks quite different, especially in probing for the negotiation of interpersonal meaning.

Extended challenge happens infrequently in the corpus I used to develop my approach to coding. Confrontation, as Eggins and Slade (1997, 182) note in the case of casual conversation, is typically associated with increased interaction because it places an implicit or explicit demand for a response in the form of either rebuttal or acquiescence. In the corpus discussed here, increased interaction accompanies challenge; however challenge is always reconciled either immediately within the exchange or shortly afterwards in subsequent exchanges. That is, the confrontation only lasts a few turns before a supportive turn appears. Supportive shifts around challenge occur at three levels—that of pairs of turns (e.g., “yes, but”); that found within the exchange which shifts interaction towards affirmation and acquiescence; and that found across exchanges at the level of the sequence, which entails thematic shifts often introduced by colleagues not involved in the initial challenge.

The shift from challenging to supportive moves within and across exchanges does not mean that the thematic elements of the challenge are likewise reconciled. Patterns of challenge demonstrate how the negotiation of interpersonal and ideational meaning can be separate. In the supportive sets described above, the negotiation of difference hinges on the mutual development of social relations and of ideas, especially in co-development through tracking. However, following challenging moves, interpersonal meaning may shift towards support, while resolution of ideational meaning may still hang in the balance. In this way, challenging sets appear to introduce a thematic disequilibrium that may spread, like ripples in a pond, over extended periods of time.

The longest sequences marked by challenge were among the most generative in terms of outcome for the group; however, sustained challenge only occurred among a handful of the most senior and longstanding members of the group. The overall supportive character of these sequences certainly does not mean that no confrontation occurred outside of exchanges that unfolded primarily as a result of challenging moves. On the contrary, occasional challenging moves were interspersed frequently with interaction that was, nonetheless, predominantly made up of supportive moves. In these instances, for the most part, challenge served within the exchange to prolong interaction in a local way, influencing the next turn but not dominating overall.

Discussion

The framework elaborated here provides a means of following the locus of control in interaction through the ongoing negotiation of social relations and conceptual relations. The dynamics of power can sustain interaction towards generative ends or, in reverse, can close interaction down. In those sequences that I have identified as indicative of collective inquiry,

reclassification through negotiation of ideational and interpersonal meaning progressively weaves a virtual context of situation within which knowledge building can occur. To extend the metaphor, the space within the weave shapes the locus of control. That is to say, the relationship between ideational and interpersonal meaning shapes the degrees to which possibilities for progressive discourse arise.

The possibilities for negotiation can be discerned from patterns of interaction. Of the patterns I have presented, the least generative is that of the exchange set labeled presentation, as it is marked by both the domination of social relations and the monologic elaboration of ideas. Co-development through tracking, on the other hand, offers a pattern of interaction that knits movement in social relations tightly with the elaboration of ideas. In the use of particular speech moves such as tracking moves, the more senior members of the team relegate control in ways that allow junior members to contribute in a wider range of ways. The tracking probe introduces both new information as well as the possibility of a greater range of positions within interaction. Ana's role as a junior teacher exemplifies this in the excerpts used to illustrate supportive patterns. In Excerpt 3, the pattern of co-development through tracking offered the means of bootstrapping her interaction, revealing the tentativeness of others' claims and allowing her to put forward her own tentative claims that could then be taken further by her and others.

The orchestration of movement between ideational and interpersonal meaning to explain progressive discourse works effectively for supportive interaction, but it does not help to explain the type of negotiation of difference that arises in patterns of sustained challenge. Both the most interactive pattern of support as well as that of challenge involve multilogue—the interaction of several participants in a sustained way that brings new ideas into the conversation. However, patterns of interpersonal meaning making in each are distinct, which influences how ideas develop. As noted earlier, sustained challenge introduces thematic elements that continue to resonant well beyond the immediate interaction. In the corpus analyzed here, themes broached through challenge frequently recurred across sequences and events, offering opportunities for elaboration over stretches of time rather than within a single interaction. Sustained challenge at the level of the exchange does not allow space for the bootstrapping evident in co-development through tracking. In interaction marked by challenge, social relations remain relatively static; simultaneously, ideational meaning becomes increasingly unsettled. I noted earlier that Hasan's studies (2001) of mother-child interaction emphasized the importance of the reordering of social relations to the reclassification of contexts necessary to building knowledge. In light of Hasan's findings, the results of this study indicate that patterns of sustained challenge limit the potential for collective knowledge building within a particular exchange, relative to the potential for knowledge-building within exchanges characterized by highly-interactive, supportive patterns. The lack of reordering of social relations corresponds with the diminished potential for reordering relationships among ideas. However, patterns of sustained challenge may have more pronounced effect on the development of knowledge beyond any particular interaction because of the instability of ideational meaning that results. This distinction brings a more nuanced, developmental understanding to the notion of "critical collegiality" (Ball and Cohen 1999; Lord 1994) which is advanced frequently as the most important criterion for effective collective inquiry (e.g., Borko 2004; Cochran-Smith and Lytle 2009; Curry 2008).

The discussion of the most interactive supportive and challenging patterns of speech functions above points towards the ways this framework can contribute to empirical investigation of the dynamics of power in professional collaboration. At the beginning of the

paper, I sketched two perspectives on collective inquiry that are seemingly in conflict. Proponents, on the one hand, highlight the centrality of collective inquiry to teacher professionalism; critics, on the other, warn of concertive control over local knowledge production. A social semiotic perspective accepts both as possibilities that are open to study through close examination of the interplay among social relations and relations among ideas. Such a perspective emphasizes that participants are constantly negotiating control in interaction, with collective inquiry as one particularly complex example in which interpersonal and ideational meaning are under constant negotiation.

Conclusion

The analytic framework elaborated here allows for close description of the negotiation of difference over time through recurrent patterns in interpersonal and ideational meaning making. The intention in so doing is not simply to frame the process of meaning making in particular settings but to connect these processes to the broader social dynamics at play in settings of educational change. Towards that end, this approach has been used to compare interaction across settings (Eddy Spicer 2006) and to study the dynamics of authority in interaction to track the emergence of a junior teacher as she becomes a more active contributor to generative discussions (Eddy Spicer 2007).

The analytic framework provides a useful entry point for revealing aspects of the complex array of forces shaping and shaped by teachers' collaborative work as that work unfolds through everyday interaction. Clarifying patterns in the negotiation of ideational and interpersonal difference and the ways those patterns fit with macro-social processes contributes to a more complete and empirically-grounded understanding of teacher professional collaboration as a component of educational change.

[7,218 words]

Appendix: Transcription conventions

The following basic transcription conventions are used in the excerpts:

#	pause between words
##	long pause between words
xxx	unintelligible speech, not treated as a word
xx	unintelligible speech, treated as a word
[?]	unintelligible, preceding word is best guess
[!]	stress
[text]	transcriber comment or local event (e.g., laugh, groan, etc.)
[//]	self-correction
[///]	restart
text(text)text	partial or non-completed word
…	trailing off
<text> [>]	overlapped speech
<text> [<]	overlapping speech
(number)	a turn made up of a single move, e.g., (3), appearing at end of turn
(number letter)	a turn made up of more than one move, e.g., (3a), appearing at end of each move

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Table 1
Major reacting speech function classes arrayed according to two dimensions of group interaction.

	Conclude	***Sustain***
Challenge	Confrontational reply (RY-)	Challenging move (RJ-)
Support	Supportive reply (RY+)	Tracking move (RJ+) Developing move <DV>

Table 2: Exchange sets of sustained support

Label	Description	Dominant speech functions
Presentation	Presentation (and/or continuation) by primary speaker with others' affirmation and/or simple requests for clarification	Continuing moves (CO)
Presentation with tracking	Presentation augmented by requests for clarification and/or requests to ratify implications of points raised by main speaker	Continuing moves interspersed with tracking moves (CO, RJ+)
Co-development	Speakers' mutual development of opening proposition	Developing moves (DV)
Co-development through tracking	Multiple speakers' co-development of proposition along with requests to clarify points raised or ratify implications of points raised	Developing moves with tracking probe moves (DV, RJ+)

Table 3: Schematic of interactional pairs and corresponding speech functions, Excerpt 4.

Moves Speaker 1:Speaker 2	**Corresponding speech functions**
2b:3	clarification:resolve
4:5	clarification:repair
6:7	development:repair
8:9	clarification:resolve
10:11:12	development:development:development

Figure 1
Idealized schematic of sequential organization of dialogue among three speakers, A, B, and C.

[figure_1_control.tiff]

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